

UNPUBLISHED, PRELIMINARY DATA  
University West Virginia  
NSG-533

Status Report  
on  
Investigation of the Constitutive  
Equations for Multi-phase Hypoelastic Materials

~~NASA-10-63~~

by  
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for  
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Object of Proposal: To develop the effective constitutive equations for a macroscopically homogeneous multi-phase hypoelastic material.

Summary of Present Status: It was the original intent of this investigation to develop some basic variational, uniqueness, and extremum principles analogous to those of classical elasticity theory which would be applicable to hypoelastic materials. A set of such theorems has now been developed which are applicable not only to hypoelastic materials, but also to the broader class of linear hygro-steric materials. In the development of these theorems, it was necessary to place some restrictions on the exact form of the constitutive equations. The effect which these restrictions has on the applicability of these theorems to real materials is one of the problems presently under consideration.

In addition to the development of the aforementioned theorems, a study is underway in regard to possible related experimental investigations which will ultimately be necessary to verify or refute the applicability of the theory to problems involving real materials.

Objectives of Remaining Research Period: As stated in the previous paragraphs, a study is presently underway to determine the applicability of the theorems to real materials. It is felt that some knowledge in this regard is essential before this approach to the multi-phase material problem can be pursued with any expectation of success. Thus, work is being directed toward developing theoretical and experimental research programs pertaining to the behavior of various real materials which are used in the space industry. It is hoped that financial support for this extensive materials investigation will be forthcoming.

Publication Plans: At present, one paper related to the present investigation has been submitted for publication and another more extensive paper is in preparation. It is hoped that the publication of these papers will help the investigator establish his credentials and thus increase the possibility of financial support for the previously mentioned long range research programs.